ABSTRACT

Title of Thesis: THE EFFECT OF CHILD GENDER ON PARENTAL NONVERBAL COMMUNICATION

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Previous work has studied parental verbal communication and found differences based on child gender. The current study was designed to better understand any differences in maternal nonverbal communication based on child gender. The nonverbal parameters analyzed were eye contact/joint attention, gestures, positive and negative facial expressions, and open and closed body language. Previously recorded mother-child play sessions when the children were 7 months (n=103) and 24 months (n=73) were coded to assess three main questions: a) Does maternal nonverbal communication differ with child gender? b) Does maternal nonverbal communication change over time? c) Does maternal nonverbal communication effect vocabulary outcomes at 24 months? Mothers used more positive facial expressions with girls at 7 months and more gestures with boys at 24 months. Mothers were consistent in their use of positive facial expressions and gestures over time. Finally, there was no apparent relationship between maternal nonverbal communication and vocabulary.

THE EFFECT OF CHILD GENDER ON PARENTAL NONVERBAL COMMUNICATION

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Introduction

There are several meaningful ways that parents can relay messages to children beyond the use of verbal communication. Parents may use eye contact, facial expressions, body language, and gestures either to express information, such as emotional state, or to support co-occurring verbal messages (Ekman & Friesen, 1969). Different information can be obtained from observing these forms of communication. For example, facial expressions allow communication partners to learn more about the nature of the emotion portrayed, while body actions and still body positions provide information regarding intensity and nature of an emotion (Ekman, 1965; Ekman & Friesen, 1967). The use of nonverbal behaviors can aid children's development and impact their ability to socialize (Dunsmore, Her, Halberstadt, & Perez-Rivera, 2009). Nonverbal communication has important ramifications, as it can also affect and reflect the bond between a parent and child and provide perspective in conversations (Schachner, Shaver, & Mikulincer, 2005). Despite a potential wealth of information to be found in parents' nonverbal communication, the majority of previous literature has generally studied verbal parental communication rather than nonverbal communication (Grebelsky-Lichtman & Shenker, 2017).

Both verbal and nonverbal communication may be different when directed toward sons versus daughters. Research has demonstrated that parents tend to communicate and interact differently with their children, depending on child gender (Moss, 1967; Tauber, 1979). Thoman, Leiderman, and Olson (1972) found that first-time mothers used more verbal communication with female infants compared to male

infants and argued that this may explain why girls tend to vocalize earlier than boys. Mothers potentially believe that boys require more discipline, as they tend to behave more strictly with their sons compared to their daughters (Bugental, Love, Kaswan & April, 1971). Parents tend to incorporate a higher number of emotion words, regarding sad feelings in particular, in their communication with daughters compared to sons and this is seen with both English and Spanish-speaking mothers (Aznar & Tenenbaum, 2015; Denham, Bassett, & Wyatt, 2010; Dunn, Bretherton, & Munn, 1987; Fivush, Brotman, Bucker, & Goodman, 2000). This may in turn influence how girls differ from boys in expressing emotions. Mothers also incorporate more types and more intense use of facial expressions with girls compared to boys (Fivush et al., 2000). This may shape how girls and boys use facial expressions as they develop (Fivush et al., 2000).

Despite the research that has studied facial expressions directed toward boys and girls, there is a gap in our understanding of how parents' nonverbal communication differs by gender compared to verbal communication. The current study was designed to address this gap. The next sections of this paper describe what is currently known about nonverbal communication, gender differences, and potential implications of these nonverbal behaviors.

Nonverbal communication in the literature

Nonverbal communication can encompass a wide range of features, including body movement, facial expressions, posture, gesture, interpersonal distance, touch, and others (Boice & Monti, 1982). The current study focused more specifically on four particular forms of nonverbal communication: deictic gestures, facial

expressions, eye contact/joint attention, and body language. These four forms were chosen because each has been shown to have a direct impact on children's development. Facial expressions impact young infants' development of social skills and communication (Young-Browne, Rosenfeld, & Horowitz, 1977). More specifically, a mother's use of positive expressions relates to children's ability to identify emotions, specifically happiness, with their mothers and other unknown women (Dunsmore & Smallen, 2001). In contrast, mothers' use of negative expressions is not known to relate to children's ability to identify happiness or anger (Dunsmore & Smallen, 2001). Because of this potential difference, the current study examined both positive and negative facial expressions as separate types of nonverbal communication. The majority of studies analyze how infants process facial expressions using unfamiliar people as the stimuli (Safar & Moulson, 2017). This study aimed to look more closely at the way young children are impacted by the facial expressions of familiar people, their mothers.

Gestures are used the most when verbal communication is interfered with by noise, distance, a person's communication impairment, or when observing something within the environment (Ekman & Friesen, 1969). However, gestures can also be used during verbal communication, such as while greeting someone (Ekman & Friesen, 1969) and during social communication as seen when someone is pointing, and nodding or shaking their head (Fusaro, Vallotton, & Harris, 2014). Fusaro et al. (2014) found that, over time, mothers' use of head nods was related to reinforcing their child's speech and played a role in mothers asking yes/no questions, while headshakes indicated that the child's behavior was not appropriate. These types of

gestures are important because they convey feedback and encouragement to children as they are learning how to socialize and communicate (Fusaro et al., 2014). When analyzing English mothers and their 20-month old infants during different structured and unstructured tasks, researchers found that the majority of gestures used were deictic (e.g., pointing and other movements that demonstrated an object, person, or occurrence in the environment) in nature (O'Neill, Bard, Linnell, & Fluck, 2005). This is consistent with previous research that found that mothers typically use deictic gestures compared to other forms of gestures when communicating with children (Iverson et al., 1999). Because of this frequent use, deictic gestures were one form of nonverbal communication examined in the current study.

Eye contact is an important part of communication in the relationship between mother and child. In Western societies, face-to-face interactions are prioritized early in a child's life and include mutual eye contact between parent and child (Keller, 2000; Lohaus, Keller, & Völker, 2001). Eye contact between mother and child at 3 months of age is known to be one of the first developmental aspects of the bond that is formed between them (Lohaus et al., 2001). While there is literature examining face-to-face interactions between infants and their caregivers (Keller, Louhaus, Völker, Cappenberg, & Chasiotis, 1999), there is limited research that discusses maternal eye contact in detail, particularly at older ages. In a longitudinal study, Lohaus et al. (2001) found that maternal eye contact during the first few weeks of the infants' life predicted mothers' sensitivity regarding how they perceived their child's behaviors and responded to these behaviors. The authors were also able to find that an increase in maternal eye contact led to a decreased amount of infant crying. Lohaus et

al. (2001) recommended that future research on infant development assess eye contact and how this affects maternal interactions. Even though there is a minimal amount of existing literature regarding maternal eye contact in toddlers, there is evidence that suggests that eye contact is an important nonverbal parameter to study.

The way the body is presented is also an important aspect of communication as parents interact with their child (Runcan, Constantineanu, Ielics, & Popa, 2012); however, compared to the other nonverbal behaviors discussed, there is not as much literature discussing how body language affects child development. Body language while communicating can support or refute other aspects of communication, such as the tone of a message (Runcan et al., 2012). The type of body language used during parent-child interactions can affect how a child interprets certain messages. Body language can be described as a) open, which can include unfolded arms and uncrossed legs or b) closed, which can include folded arms and crossed legs (Borg, 2009). Positive states, such as being comfortable, are supported by open body language whereas negative states like discomfort or nervousness are conveyed by closed body language (Borg, 2009). Thus, as parents interact with children using body language, they are able to share different messages regarding their feelings, which can help children understand different emotions. Despite the limited amount of research on this nonverbal parameter, we expected that mothers would use more open and welcoming body language with girls compared to boys, based on prior findings with facial expressions. It should also be noted that although we focus on open and closed body language in this study, this is not the only way to describe or study body language.

Children are known to be sensitive to the type of nonverbal communication used by their parents. In one study, pre-school-aged children were presented with soundless videotapes of either their mother or another child's mother having a conversation with other adults (Abramovitch, 1977). They were asked to decide whether the person being spoken to was male or female, and whether it was someone the speaker already knew or not (Abramovitch, 1977). Children were able to accurately assess familiarity and gender of the adults communicating with their own mother, but they were unable to do so when assessing other mothers (Abramovitch, 1977). Thus, children appear to become familiar with the nonverbal communication they are exposed to by their mothers.

Different forms of nonverbal communication can relay significant meaning; however, although there are some similarities, there are a variety of differences in the use of these behaviors in terms of purpose, method, audience, and implications. This project aimed to explore specific forms of nonverbal communication in more detail in order to better understand these differences.

Gender differences in communication

The literature describes clear differences in parent-child relationships depending on parent and child gender (Russell & Saebel, 1997). Furthermore, research has shown that a child's gender plays an important role in how a mother communicates with the child (Weitzman, Birns, & Friend, 1985). Weitzman et al. (1985) examined how mothers communicated with their children between the ages of 2 ½ and 3 ½ years old in an attempt to see if differences in the mothers' expectations for their children based on gender were evident in their teaching and storytelling

styles. The parent-child dyads were observed in their homes and the mothers were asked to tell a story to their child based on a wordless book. In addition, the mothers were asked to have their child organize "female" (kitchen and sewing materials) and "male" (balls and cars) items followed by a 10-minute free play session. Mothers provided more verbal input in terms of a) teaching, b) using various vocabulary, c) asking questions, and d) using directives, and spoke more explicitly with their sons compared to their daughters (Weitzman et al., 1985). These results demonstrate a clear difference in communication between mothers and their sons versus daughters. This contradicts literature previously described in earlier sections of the paper; however, it demonstrates a need for more research in this area.

In a longitudinal study by Tauber (1979), parent-child pairs participated in a play session where the child was able to play freely in a "feminine" toy area (including doll materials), a "masculine" toy area (including castles, knights, etc.), an active toy section (including stilts, a trampoline, etc.) and a more inactive section (including puzzles and art crafts). The sessions were designed so that the level of parent involvement was decided by the parent-child dyad. Parents interacted in different manners with girls compared to boys (Tauber, 1979). Parents with daughters participated in the social aspects of the play session, such as completing puzzles or making art, while parents with sons participated in the more active options available, such as using stilts or the trampoline with their child (Tauber, 1979). These types of interactions can potentially lead to stereotypical behavior suggesting that girls are more passive and boys are more active.

In a separate study, parents and 18-month old children were observed playing together with a specific toy set, and then the children were observed playing alone (Weinraub & Frankely, 1977). One parent entered the room with each infant during the play session. Observations showed that parents interacted differently with boys versus girls; however, boys and girls did not behave differently toward their parents during the play session (Weinraub & Frankely, 1977). Parents communicated more, had an increased number of interactions, and shared more with same-sexed children compared to opposite-sexed children (Weinraub & Frankely, 1977). Thus, mothers interacted more with their daughters, while fathers interacted more with their sons. According to the authors, these results highlight how parents can play a large role in the creation of sex differences.

Parent-child relationships have also been analyzed in Norway. In one particular study, there was a specific interest in the way fathers and mothers differed in interactions with their child based on child gender (Nordahl, Janson, Manger, and Zachrisson, 2014). In a longitudinal study, mother-child and father-child pairs were asked to participate in a structured play session for 15 minutes. In families with only sons, the fathers engaged more positively with their child than did the mothers (Nordahl et al., 2014). However, in families with both sons and daughters, the mothers engaged with the children in a similar manner despite gender (Nordahl et al., 2014). Fathers also used more nonverbal and verbal communication than mothers regardless of child gender (Nordahl et al., 2014).

Even though there are mixed results regarding how parents communicate and interact with their children depending on gender, the majority of the literature

demonstrates that mothers (the focus of the current study) are more engaged and communicate more in their interactions with daughters compared to sons. The current study was developed in order to add to the existing literature on nonverbal communication and highlight any gender differences.

Relationship between nonverbal communication and vocabulary development

Vocabulary size varies among young children (Rowe, Özçalışkan, & Goldin-Meadow, 2008). Parental verbal communication is known to correlate to a child's vocabulary size, but there are other factors that can affect vocabulary, including gesture use (Pan, Rowe, Singer, & Snow, 2005; Rowe et al., 2008). Compared to other nonverbal communication behaviors, most studies have focused on how gesture use correlates to vocabulary. Parents typically use gestures in addition to verbal input and there are correlations between the use of these gestures and an increase in children's vocabulary size (Acredolo & Goodwyn, 1988; Iverson et al., 1999; Özçalışkan & Goldin-Meadow, 2005; Pan et al., 2005; Rowe & Goldin-Meadow, 2009). Rowe and Goldin-Meadow (2009) found that parents in a high socioeconomic status (SES) group used gestures with their 14-month infants in a broader manner, and more often, compared to parents in the low-SES group. According to the authors, the difference in gesture use, as well as parental verbal input, partially explains the large difference in vocabulary size between SES groups. In another study, which appears to use participants from the same longitudinal study, Rowe et al. (2008) found that parental gesture use did not have a direct impact on children's vocabulary development; however, it did have an effect on gestures used by the children, which predicted vocabulary development two years later. Özçalışkan and Goldin-Meadow

(2005), which also appears to use participants from the same longitudinal study, found that it was unlikely that parental gesture use affected children's gesture use and later developing speech. Since parents used minimal gestures while communicating to the children in their study, it was likely that children's own use of gestures helped them facilitate speech as they developed (Özçalışkan & Goldin-Meadow, 2005).

Although the majority of evidence has focused on the way parental verbal input can improve children's vocabulary, the existing literature demonstrates how parental gesture use can also lead to an increase in child vocabulary size. The current study expected to find the same results and explored the relationship between vocabulary and other aspects of nonverbal communication that have not been studied as much.

Consistency of nonverbal communication over time

A notable amount of research has demonstrated that communication within a parent-child relationship significantly affects child development and later socialization (Hollenstein, Granic, Stoolmiller, & Snyder, 2004; Kochanska, Aksan, Prisco, & Adams, 2008; Nordahl et al., 2014). However, it is not as clear how communication changes over time, as the majority of studies have assessed mothers' nonverbal communication use at a single point. Rowe et al. (2008), found that the number of gestures parents used was constant over time when the children were 14 to 34 months old. Özçalişkan and Goldin-Meadow (2005) showed that the caregivers who did use gestures with speech while communicating with their child continued to do so over an eight-month period. However, other nonverbal behaviors have not been studied and neither study examined children as young as those in the current study.

As a result, it was unclear whether maternal nonverbal communication in the current study would change between 7 and 24 months.

Summary

The literature described above leads to a few primary conclusions. First, when parents communicate with their children, both verbal and nonverbal components are used. While some nonverbal components have been well studied, such as gestures, other components have received less attention. We know that parents talk differently to boys and girls, but it is less clear if their nonverbal communication might differ across genders. Parental communication patterns impact children's subsequent language development, but the majority of research has explored how verbal communication impacts verbal outcomes (Pan, Rowe, Singer, & Snow, 2005) and there is less research showing whether nonverbal cues might likewise do so. There is also relatively little research demonstrating how the use of nonverbal cues may change over time. The study discussed below aimed to address these gaps in the literature.

Research question, approach, and hypotheses

This study was designed in order to: a) assess the frequency and type of nonverbal communication mothers use with their children, b) determine how this differs based on child gender, c) examine how these results change over time, and d) understand how these results relate to vocabulary outcomes at 24 months.

This project used videos of parent-child interactions collected during a previously completed longitudinal study (Newman, Rowe, & Ratner, 2016). In their

study, the authors from the University of Maryland, College Park, assessed children between 7 and 24 months in order to better understand the relationship between speech segmentation, statistical learning, and input from the mothers and how these components affected language development in these children. More specifically, children visited the lab at 7, 10, 11, 18 (for a subset), and 24 months. During each visit to the lab, they participated in a mother-child play session, which formed the basis for this project.

Based on the findings in previous literature, the following predictions were made:

- It was predicted that mothers would use more and more positive nonverbal communication with girls compared to boys. For maternal eye contact/joint attention, we predicted that mothers would maintain eye contact for a longer period of time and/or have more joint attention with girls. For gestures, we predicted that mothers would use more deictic gestures (e.g., pointing or showing the child an object within the environment) with girls compared to boys. For facial expressions, this meant that mothers would use more positive facial expressions with girls and more negative expressions with boys. Finally, for body language, we predicted that mothers would use more open body language with girls and more closed body language with boys. These analyses were completed when the children were 7 and 24 months old. We only expected to find gender differences at the 24-month stage since the literature discussed in earlier parts of the paper found gender differences

emerged as the children developed. As a result, we predicted an interaction between age of the child and the child's gender on the parent's behaviors.

- It was also predicted that those mothers who used more nonverbal communication behaviors with their children at 7 months would use more of the same nonverbal behaviors at the 24-month stage, as there is limited research that discusses change in the frequency of nonverbal behavior. This meant that mothers who used more nonverbal behaviors when children were younger would continue to do so when they were older. For example, mothers who used more gestures at 7 months would continue to use more gestures at 24 months.
- Finally, it was predicted that the children who received more nonverbal communication from their mothers would have larger vocabulary sizes. If this prediction proved true, and girls received more nonverbal communication in general, we thought that this would potentially help explain the known fact that girls tend to have an increased vocabulary size in the early stages of development (Eriksson et al., 2012; Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991). This was analyzed separately for boys and girls in order to differentiate between differences in the amount of nonverbal communication and differences related to gender alone. However, since we did not predict gender differences at the earlier age, we also examined this across both genders in combination (giving us more statistical power).

Methods

Mothers' nonverbal communication behaviors from a longitudinal study were observed and coded from recorded mother-child play sessions. The following nonverbal behaviors were analyzed: a) eye contact/joint attention, b) deictic gestures, c) positive facial expressions, d) negative facial expressions, e) open body language, and f) closed body language. These behaviors were examined in order to assess frequency and use, gender differences, consistency, and the effect on vocabulary development.

Participants

Mother-child dyads visited the lab when the children were 7, 10, 11, 18 (for a subset), and 24 months. For this study, we examined the visits at ages 7 months and 24 months in order to assess the use of nonverbal communication over time. There were 125 mother-child participants that completed the original longitudinal study.

There were a number of factors that determined eligibility for this study. First, child participants had to be born at least 3 weeks within their scheduled arrival date. In addition, English had to be their native language and their mothers were also required to be native English speakers. Finally, children did not qualify for the study if they were known to have any developmental impairments. Each time the families arrived for their visit, the experimenter inquired about any change in medical history. The mothers included in this study were primarily Caucasian and college-educated.

Due to various reasons (discussed in detail below), there were fewer participants included in the current study. The number of participants was also different at each age group. At 7 months, there were a total of 103 participants (54

girls and 49 boys). At 24 months, there were a total of 73 participants (41 girls and 32 boys). Participants were excluded from the current analysis for the following reasons: a) if a child had a language delay (n=1), b) if the father participated instead of the mother (n=2), c) if data were unable to be obtained due to camera angles/video quality (at 7 months n=16; at 24 months n= 5) and d) if the video recording was unavailable entirely (e.g., the parent had initially only agreed to the audio recording rather than the video, the stored video became corrupted over time or was lost, etc.; at 7 months n=3; at 24 months n=44 – the latter high number was the result of a hard-disk crash between the time of the original study and the current study). Since there were different participant numbers per age group, participants were matched across age groups as needed for the ANOVA and correlation analyses listed below. This means the 7-month children who did not also have data at 24 months (for any of the reasons listed above) were excluded from the ANOVA and correlation analyses. The final set of mothers were Caucasian (n=79), African American (n=9), Hispanic (n=3), African American/Caucasian/Native American (n=1), Caucasian/Hispanic (n=1), Caucasian/Asian (n=4), Asian/Caucasian/Hispanic/Native American (n=1), African American/Caucasian (n=2), Hispanic/Pacific Islander (n=1), Caucasian/Haitian (n=1), and one reported themselves as biracial (n=1).

Experimental Design

The current study analyzed the mother-child interactions at the 7-month stage and 24-month stage in order to allow the maximum amount of time to potentially see a difference in communication. In this study, mother-child play sessions were coded for maternal eye contact to the child's eyes or head and joint attention (to account for

child activity choices), deictic gestures, positive facial expressions, negative facial expressions, open body language, and closed body language. These are all forms of nonverbal communication that have been analyzed to some degree in previous literature and they all play an important role in everyday conversations. Videos were reviewed prior to choosing the nonverbal communication targets in order to determine which behaviors would be available to code. The *MacArthur-Bates Communicative Development Inventory (MCDI)* at 24 months was the selected vocabulary measure to assess children's vocabulary size because it distinguishes among a wide range of individual differences in children.

Coding these nonverbal behaviors required a time-window for counting. Each parent-child play session lasted approximately 15 minutes. During these play sessions, children and parents were free to move around the room, as they were not restricted by anything, such as car seats. This means that certain parts of the play session were not codable for some of the nonverbal parameters (e.g., eye contact/joint attention, gestures, or facial expressions) if the parents were turned from the camera. To avoid including times when the parent and child were warming up, or when the child was getting tired, we opted to use a 6-minute section from the middle of the play session. However, this was adjusted depending on the activity during this portion of the play session. For example, if the camera angle was not centered on the parent/child or if the mother was reading to the child, these portions were not used. Instead, the video was adjusted forwards and backwards, in order to code a total of 6 minutes of interactive time. In order to make the coding more feasible, we coded the first 15-second window out of each of those 6 minutes. Therefore, for each nonverbal

communication behavior, there were six 15-second windows. We chose 15 seconds as a reasonable window for these actions, based on a pilot assessment. Prior studies have made different choices in this regard, but generally were looking at other behaviors. For example, Grebelsky-Lichtman & Shenker (2017) used 1-second windows, but other behaviors were also examined, such as proxemics (e.g., moving toward the child, moving away from the child, etc.).

Nonverbal communication in the current study was coded in the following ways:

a) Maternal eye contact/joint attention – This was coded for the amount of time in seconds that mothers maintained eye contact with their children's eyes and/or head. Joint attention (that is, looking at what the child was focused on, rather than looking at the child) was also included in this measure to give credit to mothers that did not have an opportunity for eye contact based on the child's activity. The children did not have to be looking back at the mother in order for this behavior to be coded since the focus of this study was the mothers' behavior. The value obtained from each 15-second window (seconds of eye contact/joint attention) was summed for this behavior, resulting in a single value that could range from 0 to 90.

b) Gestures – We counted the number of deictic gestures (e.g., reaching for an object, pointing, or showing the child an object within the environment) that mothers used. Mothers' use of deictic gestures has been analyzed to great length in the literature so this research was designed to build upon and expand

on current research. Similar to the other behaviors, the data collected from these 15-second windows (the number of gestures used) were also summed.

c) Facial expressions – This was coded as two separate measures for the number of positive and negative facial expressions that the mothers used with their children. Expressions were coded each time they were used. This meant that when a mother smiled during the interaction, which would be a positive facial expression, that counted as a single expression and if she smiled later in the 15-second clip (following a neutral expression) that counted as two positive facial expressions. The data obtained from each 15-second window (the number of positive and/or negative facial expressions) were summed for these behaviors. We did not code the "neutral" behaviors when positive or negative facial expressions were not used.

d) Body language – This was coded as two separate measures as well. Mothers' body language was coded as being either open body language (e.g., uncrossed arms, head up and engaged with the child) or closed body language (e.g., crossed arms, or head looking down away from the child). The mothers' legs were not analyzed as part of the body language since all of the mothers were sitting on the floor during the play session. The values collected from each 15-second window (the number of seconds of open or closed body language) were summed for these behaviors. We did not code the "neutral" behaviors when positive or negative body language was not used. Although there is limited research on the effect of parental body language on

development, we expected to find that open body language would have a positive relationship with children's vocabulary development.

Data Analysis

The dependent and independent variable of each prediction is discussed below.

a) Prediction 1 (mothers will use more and more positive nonverbal communication with girls compared to boys): We expected differences by gender and for those differences to be different across ages. We compared the amount of nonverbal communication used with boys to that used with girls, using 6 unpaired t-tests, one for each of the six different forms of nonverbal communication. However, there were 12 unpaired t-tests in total because the analysis was done at each age. A 2 age x 2 gender ANOVA was performed followed by a t-test at each age as planned comparisons. We expected to find clear gender differences in each of the six types of nonverbal communication when the children were 24-months old.

For each nonverbal behavior analyzed, there is one dependent variable, the amount of nonverbal communication used by the mothers, and one independent variable, child gender. The analyses were as followed: a) Is there more eye contact/joint attention given to girls than boys? b) Are there more gestures used with girls than boys? c) Are there more positive facial expressions to girls than boys? d) Are there more negative facial expressions to boys than girls? e) Is there more open body language to girls than boys? f) Is there more closed body language to boys than girls? These analyses used the data from when the children were 7 months and 24 months.

b) Prediction 2 (mothers who use more nonverbal communication behaviors at 7 months will still do this at 24 months): We conducted Pearson's correlations between the amount of nonverbal communication (e.g., eye contact/joint attention, deictic gestures, positive facial expressions, negative facial expressions, open body language, and closed body language) each mother used at 7 months and the amount they used at 24 months. We wanted to assess whether mothers consistently used that form of nonverbal communication over time. We expected to find that mothers who used more nonverbal behaviors when the children were 7 months would still use more of these behaviors when the children were 24 months based on the existing literature that describes the use of parental nonverbal communication over time.

c) Prediction 3 (children who receive more nonverbal communication will have larger vocabulary sizes): To investigate the question of whether nonverbal communication affects vocabulary development, we analyzed whether the different nonverbal communication measures at 7 months predicted the children's vocabulary at 24 months using MCDI scores. A multiple linear regression was used with the different nonverbal behavior as separate predictors, and child vocabulary score as the dependent variable. We expected to find that children who received more nonverbal communication from their mothers at 7 months would also have larger vocabulary sizes when they were 24 months old. To ensure that the vocabulary sizes were due to nonverbal communication and not other factors, we completed this analysis separately for each gender. We also completed this analysis across both genders in combination since we did not expect to find gender differences at the earlier age.

Observations were noted throughout the video regarding toys that were included in the play session. All children were exposed to the same variety of toys, which included baby dolls, play food, kitchen items, animals, puzzles, and books. In addition, a second coder was asked to code 5% of the videos in order to establish a reliability measure between coders. After detailed training sessions demonstrating how to code the videos, followed by practice videos, five videos from the 7-month group and five videos from the 24-month group were randomly selected for the second coder to code. These results are discussed in the section below.

Coding reliability

We performed Pearson's correlations with the 10 videos coded by the second coder and the experimenter. We were able to establish reliability between the coders for eye contact/joint attention ($r=0.66$, $p<.05$), deictic gestures ($r=0.79$, $p<.05$), and positive facial expressions ($r=0.65$, $p<.05$). We were unable to complete correlations for the negative facial expressions parameter because of the limited number of facial expressions (i.e. modal value = 0); however, after reviewing the data, we were able to see that the two coders matched, as only one coder assigned a value of "1" for one child. We were unable to establish reliability for open body language ($r=0.35$, $p>.05$) and closed body language ($r=0.35$, $p>.05$). Overall, body language was an extremely subjective measure and one of the harder parameters to code. In addition, we only analyzed a very small sample size between the two coders. The results discussed below include the data obtained from the original coder.

Results

Of the six measures coded, three of the measures, negative facial expressions, open body language, and closed body language, showed very little variability. At 7 and 24 months: a) the modal value for negative facial expressions was 0, b) the modal value for open body language was 90, and c) the modal value for **closed** body language was 0. The other three measures, eye contact/joint attention, deictic gestures, and positive facial expressions showed much greater variability. Therefore, although data were analyzed for all nonverbal parameters, the data for negative facial expressions, open body language, and closed body language data will not be discussed in detail. We predict that the lack of variability with these parameters may be due to the nature of the study (mother-child play sessions), which created little opportunity for negative facial expressions and closed body language.

Gender differences

The data were analyzed based on each of the three predictions written above. The first prediction stated that mothers would use more and more positive nonverbal communication with girls compared to boys. We also predicted that this effect would be seen at 24 months when the children were older. To test this hypothesis, an ANOVA was performed in order to analyze the eye contact/joint attention, gestures, and positive facial expression values. For eye contact/joint attention, we found a significant effect of age ($F(1, 66)=15.760$, $p<.0001$), no significant effect of gender ($F(1, 66)=1.547$, $p=.218$), and no interaction between age and gender ($F(1, 66)=.159$, $p=.691$). That is, mothers used more seconds of eye contact/joint attention at 7 months (M=82.31, SD=9.22) compared to 24 months (M=75.07, SD=11.27), but did

not treat their children differently based on gender and this did not change with the child's age. Figure 1 (listed below) represents the average amount of summed eye contact/joint attention for each gender at each age group.

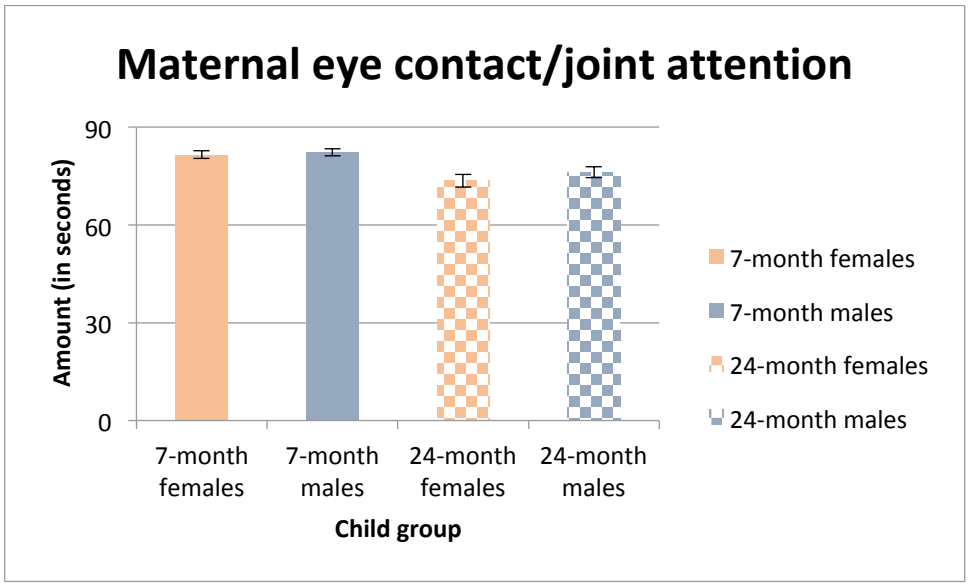

Figure 1. Amount of eye contact/joint attention at 7 and 24 months.

With regards to gestures, we found a significant effect of age ($F(1, 66)=18.725$, $p<.0001$), a significant effect of gender ($F(1, 66)=4.118$, $p=.046$), and no interaction between age and gender ($F(1, 66)=1.775$, $p=.187$). Mothers used more gestures at 24 months (M= 33.32, SD= 13.80) compared to 7 months (M=25.12, SD=13.17) and did treat their children differently based on gender, but this did not change with the child's age. The data showed that 7-month boys (M=26.55, SD=15.61) received more gestures than 7-month girls (M=23.92, SD= 10.79) and 24-month boys (M=37.58, SD=13.31) received more gestures than 24-month girls (M=29.76, SD= 13.35). Despite the lack of an interaction, follow-up t-tests showed that the effect was only significant at 24 months (7 months: (t(101) = 0.75, p=0.46);

24 months: (t(71) = 2.42, p =.018)). This direction of boys getting more gestures at 24 months than girls did not match our original prediction. Figure 2 (listed below) represents the average number of summed deictic gestures for each gender at each age group.

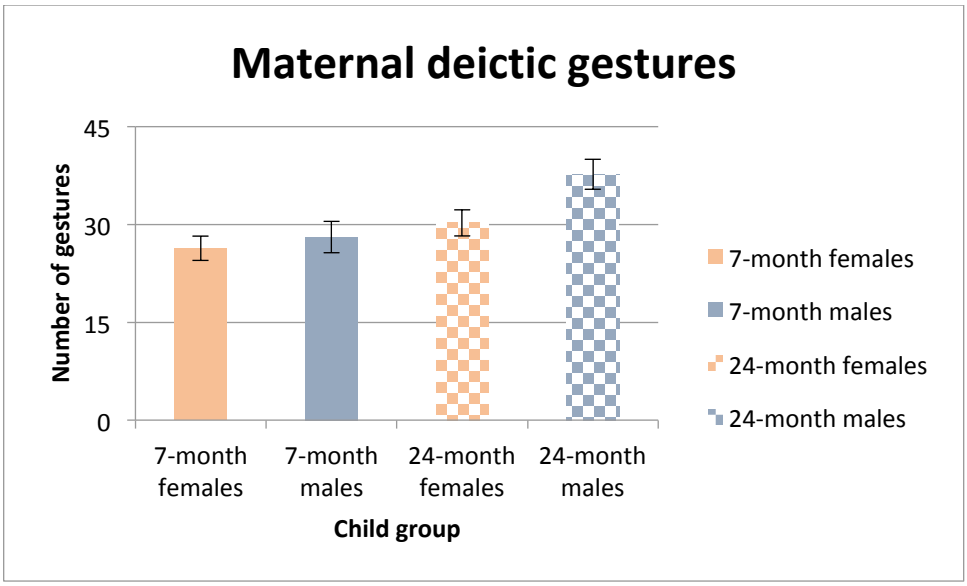

Figure 2. Number of deictic gestures used at 7 and 24 months.

In regards to positive facial expressions, we found a significant effect of age ($F(1, 66)=52.076$, $p<.0001$), no significant effect of gender ($F(1, 66)=1.653$, $p=.203$), and no interaction between age and gender ($F(1, 66)=1.019$, $p=.316$). This means that mothers used more positive facial expressions at 7 months (M=3.37, SD= 2.54) compared to 24 months (M=1.28, SD=1.70), but did not treat their children differently based on gender and this also did not change with the child's age. Our follow-up t-tests showed that there was an effect of gender, as girls received more positive facial expressions from their mothers than boys at 7 months (7 months: (t(101) = 2.71, p =.008); 24 months: (t(71) = 1.12, p=0.27)). This direction also did

not match our original prediction because we expected to see girls receiving more nonverbal communication at 24 months. Figure 3 (listed below) represents the average number of summed positive facial expressions for each gender at each age group.

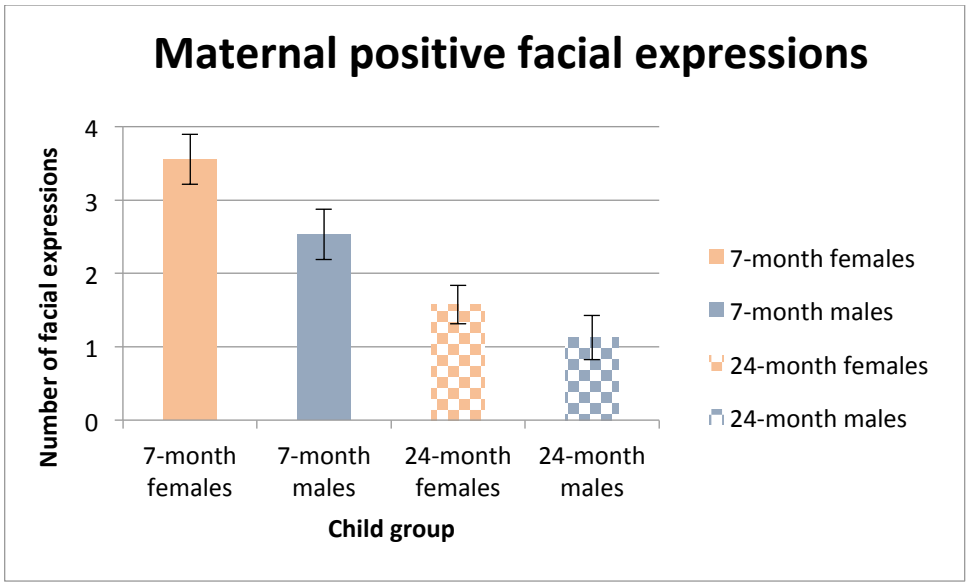

Figure 3. Number of positive facial expressions used at 7 and 24 months.

In general, then, the initial prediction that mothers would use more and more positive nonverbal communication with girls compared to boys at the 24-month stage was not borne out by the data. Mothers only used more positive facial expressions with girls (at 7 months) and used more gestures with boys (at 24 months). The t-test results for all parameters can be found in Tables 1 and 2.

Table 1: 7-month gender data

Nonverbal communication parameter	**Average for boys**	**Average for girls**	**T-test**
Eye contact/joint attention	(M=82.29, SD = 7.92)	(M=81.52, SD = 8.95)	(t(101) = 0.62, p=0.54)
Gestures	(M=28.08, SD = 16.98)	(M= 26.35, SD = 13.97)	(t(101) = 0.75, p=0.46)
Positive facial expressions	(M= 2.53, SD = 2.39)	(M=3.55, SD = 2.51)	(t(101) = 2.71, p=.008)
Negative facial expressions	(M= 0.08, SD = 0.28)	(M= 0.06, SD = 0.30)	(t(101) = 0.18, p=0.86)
Open body language	(M= 84.59, SD = 14.29)	(M= 83.84, SD = 16.04)	(t(101) = 0.17, p=0.86)
Closed body language	(M= 4.80, SD = 14.19)	(M= 5.79, SD = 15.54)	(t(101) = 0.27, p=0.79)

Table 2: 24-month gender data

Nonverbal communication parameter	**Average for boys**	**Average for girls**	**T-test**
Eye contact/joint attention	(M=76.15, SD = 9.65)	(M=73.52, SD = 12.37)	(t(71) =0.99, p=0.32)
Gestures	(M=37.72, SD = 13.12)	(M=30.26, SD = 13.11)	(t(71) =2.42, p=.018)
Positive facial expressions	(M=1.13, SD = 1.70)	(M=1.57, SD = 1.70)	(t(71) =1.12, p=0.27)
Negative facial expressions	(M=0.06, SD = 0.25)	(M=0.19, SD = 0.45)	(t(71) =1.44, p=0.15)
Open body language	(M=78.38, SD = 16.02)	(M=78.60, SD = 14.34)	(t(71) =0.06, p=0.95)
Closed body language	(M=11.63, SD = 16.02)	(M=11.17, SD = 13.81)	(t(71) =0.13, p=0.90)

In addition, we used the values obtained for eye contact/joint attention, deictic gestures, and positive facial expressions and transformed this data into summed z-scores for each child to make a constellation measure. That is, we computed a z-score for each measure for each child and summed these. After calculating the summed z-scores for each child, we performed ANOVAs and t-tests to examine if there were gender differences when completing the analysis without the "negative" nonverbal

parameters (i.e. negative facial expressions and closed body language). Open body language was not included as a parameter since there was little variability as stated previously. We did not find a significant effect of age ($F(1, 66)=0.74$, $p=0.79$), gender ($F(1,66)=1.154$, $p=0.29$), or an interaction between age and gender ($F(1,66)=2.239$, $p=0.14$). Nor were there significant differences across genders (via t-tests) at either 7 months ($t(101)=0.80$, $p=0.43$) or 24 months ($t(71)=1.45$, $p=0.15$).

Consistency of nonverbal communication use

The second prediction stated that mothers who used more nonverbal communication at 7 months would still use more of these behaviors at 24 months. In other words, we predicted that the relative use of nonverbal communication use would remain relatively consistent over time. A correlation was performed in order to analyze data. There was a significant positive correlation between 7 months and 24 months for **gestures** ($r=0.29$, $p<.05$) and **positive facial expressions** ($r=0.44$, $p<.05$). Therefore, the evidence does not support the second prediction because this pattern was not consistent with the other four nonverbal communication measures. However, two outlier children may be driving the significant positive correlation for deictic gestures because when their data is removed, the effect disappears. As stated previously, there was little variability with the data for negative facial expressions, open body language, and closed body language and, as a result, correlations across time were not very meaningful for these measures. Even though there was more variability with the data for eye contact/joint attention, there was not a significant correlation between 7 and 24 months ($r= -0.03$, $p>.05$). Parents appear to be consistent in their use of gestures and positive facial expressions over time and

inconsistent with their use of eye contact/joint attention. A plausible explanation for the inconsistent use of eye contact/joint attention is that because since 7-month old infants are not as mobile as 24-month old infants, it might be easier for mothers to look at their face and what they are doing. In addition, at 24 months, children may be more active and look at their parents less while 7-month infants look at their parents more, which encourages joint attention. Mothers might have continued to use gestures and positive facial expressions consistently because these are nonverbal parameters that can naturally be incorporated while interacting and communicating with the child. The correlation results for these parameters can be found in Table 3 and scattergrams for these parameters can be found in Figures 4, 5, and 6 below.

Table 3: 7 and 24-month correlations

Nonverbal communication parameter	**Correlation**	**Significance**
Eye contact/joint attention	-0.03	Not significant (p>.05)
Gestures	0.29	Significant
Positive facial expressions	0.44	Significant
Negative facial expressions	0.008	Not significant
Open body language	0.08	Not significant
Closed body language	0.05	Not significant

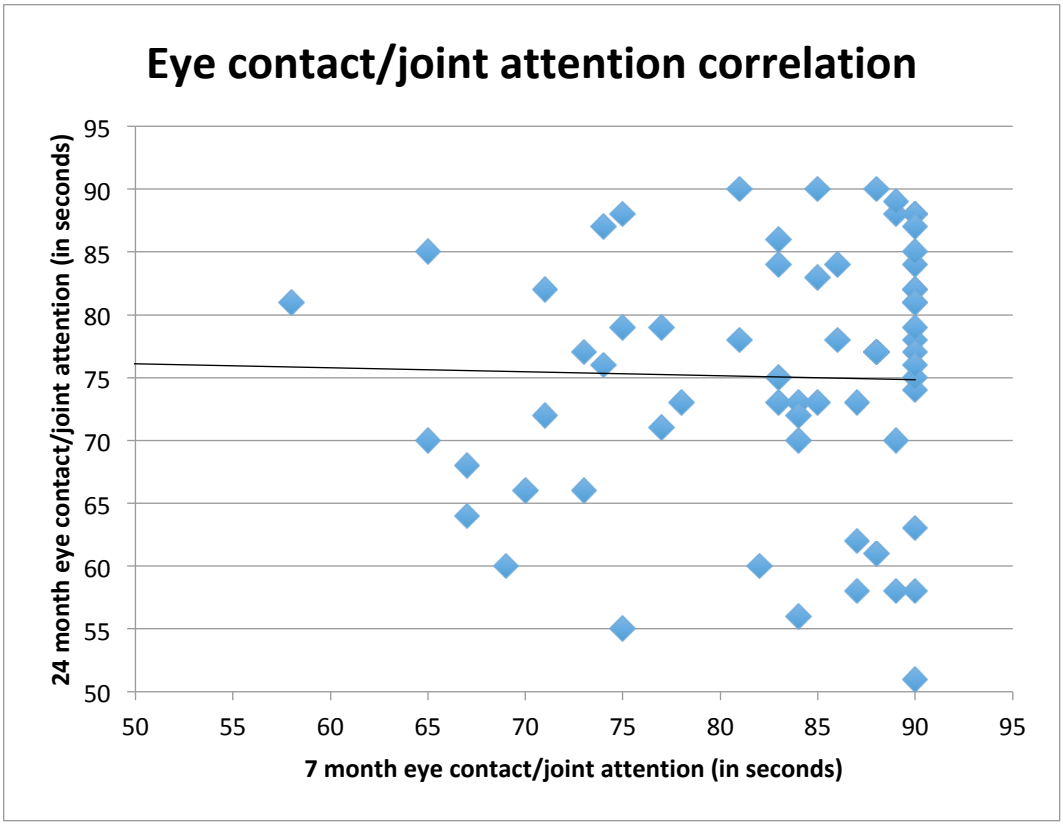

Figure 4. Eye contact/joint attention correlation.

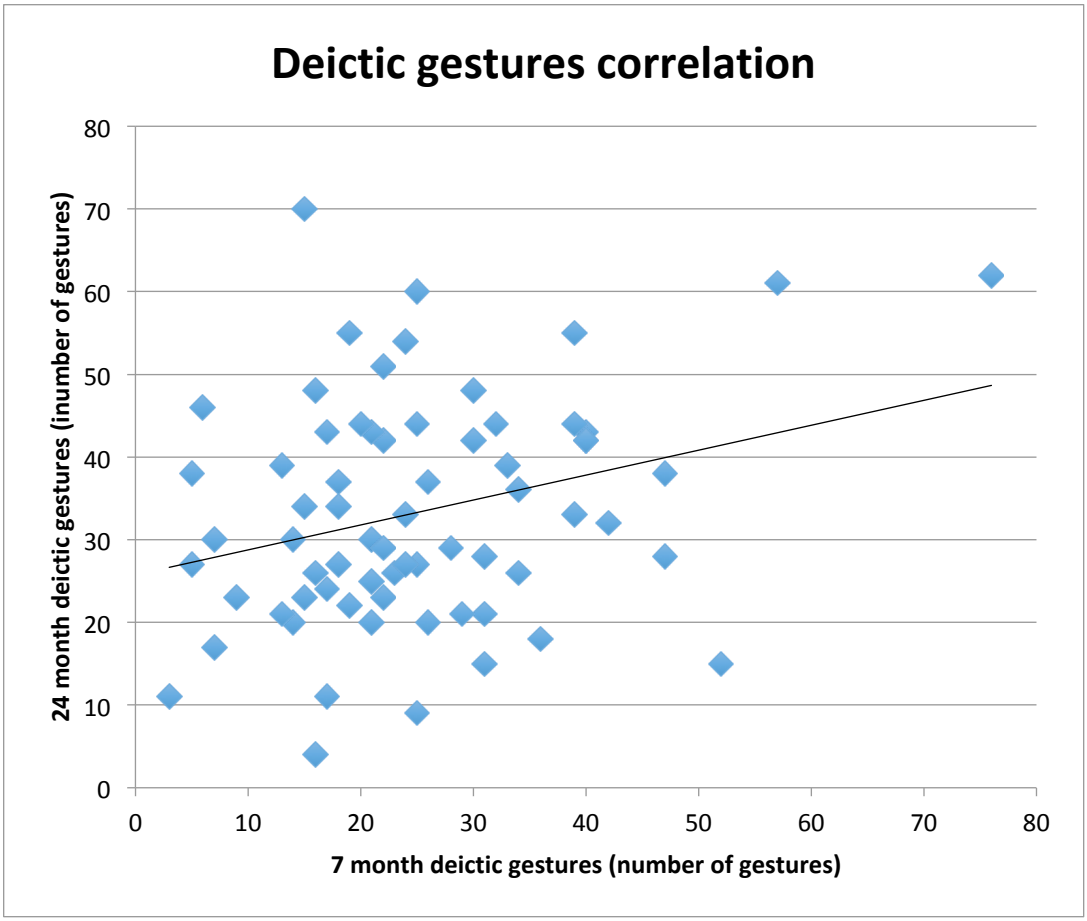

Figure 5. Deictic gestures correlations.

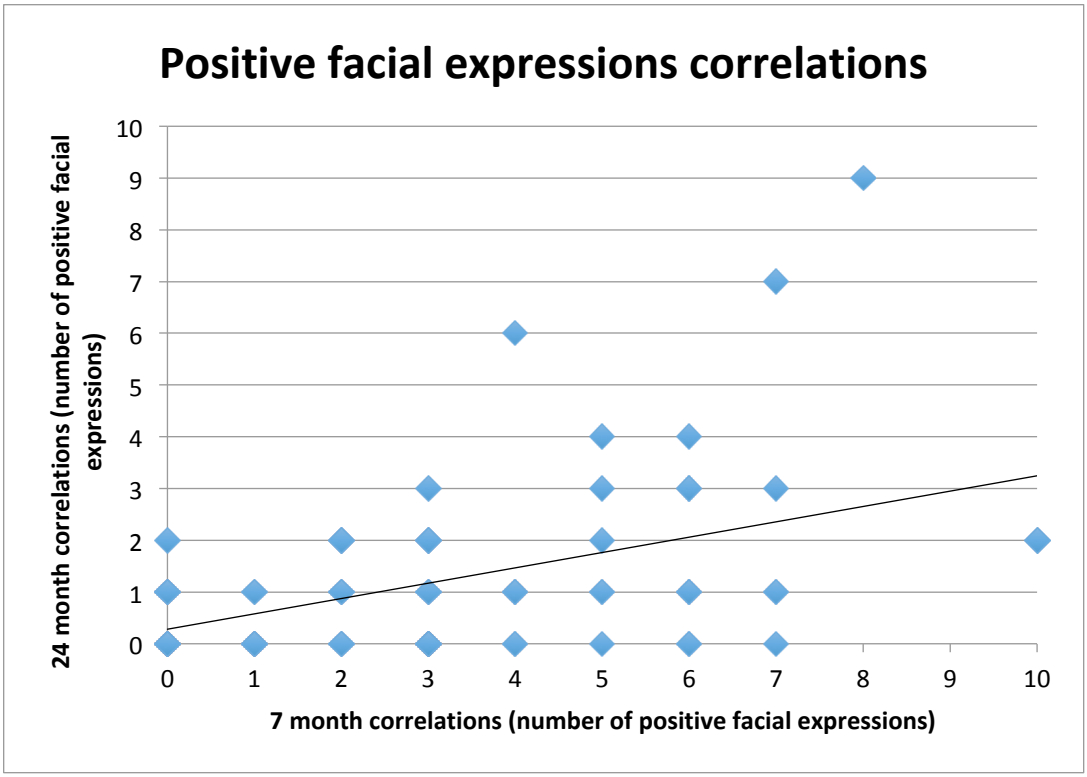

Figure 6. Positive facial expressions correlations.

Vocabulary outcomes

The third prediction stated that children who received more positive nonverbal communication at 7 months would have higher vocabulary scores (MCDI scores) at 24 months. A multiple linear regression was performed in order to analyze this data. In order to ensure that gender did not influence vocabulary outcomes, the analyses were completed by each gender. However, completing the analyses this way led to reduced power, which is why the analyses were also combined across genders.

The results demonstrated no significant relationship between the nonverbal parameters and vocabulary scores when we looked at the data for all children. The nonverbal parameters did not explain a significant amount of the variance in MCDI

scores ($F(6, 95) = 1.56$, $p>.05$; $R = 0.29$), accounting for 9% of the variance. When we looked at the nonverbal parameters and vocabulary scores separated by gender, a significant relationship was not found with females. Again, the nonverbal parameters did not explain a significant amount of the variance in MCDI scores ($F(6, 47) = 1.14$, $p>.05$; $R = 0.36$), accounting for 13% of the variance. Similar to the previous results, the nonverbal parameters did not explain a significant amount of variance in MCDI scores with boys, but a significant relationship was found in the mothers' use of negative facial expressions ($F(6, 41) = 1.12$, $p>.05$; $R = 0.38$; $t(47) = 2.033$, $p=.049$) and later vocabulary, accounting for 14% of the variance. More specifically, this means that mothers who frowned more at 7-month male infants had children with greater vocabulary outcomes at 24 months. It is not evident what this relationship might mean, but it seems likely that this may simply be a type 1 error, given the number of tests conducted. These results do not support the third prediction, as children who received more nonverbal communication of other types at 7 months did not have higher vocabulary scores at 24 months. The regression results can be found in Table 4, 5, and 6.

Table 4: Regression analyses (for all children)

Dependent variable	**B**	**Standard Error**	**Beta**	**t-value**	**p-value**
Eye contact/joint attention	1.583	1.914	.084	0.827	0.410
Gestures	-1.152	1.072	-.112	-1.075	0.285
Positive facial expressions	10.947	6.376	.173	1.717	0.89
Negative facial expressions	38.383	57.442	.066	0.668	0.506
Open body language	-.102	6.062	-.010	-0.017	0.987
Closed body language	-1.829	6.135	-.171	-0.298	0.766

Table 5: Regression analyses (for all girls)

Dependent variable	**B**	**Standard Error**	**Beta**	**t-value**	**p-value**
Eye contact/joint attention	1.106	2.761	.066	.401	.690
Gestures	-.968	1.658	-.090	-.584	.562
Positive facial expressions	10.575	8.568	.177	1.234	.223
Negative facial expressions	-40.754	70.611	-.082	-.577	.567
Open body language	-3.283	10.981	-.350	-.299	.766
Closed body language	-5.851	11.083	-.604	-.528	.600

Table 6: Regression analyses (for all boys)

Dependent variable	**B**	**Standard Error**	**Beta**	**t-value**	**p-value**
Eye contact/joint attention	3.020	3.024	.148	.999	.324
Gestures	-.712	1.457	-.075	-.489	.628
Positive facial expressions	.806	10.292	.012	.078	.938
Negative facial expressions	208.485	102.527	.313	2.033	.049
Open body language	.416	7.883	.037	.053	.958
Closed body language	-.352	7.924	-.031	-.044	.965

Discussion

The current study assessed the effect of child gender on maternal nonverbal communication use using previously recorded mother-child play sessions. In order to do this, three specific questions were asked: a) Is there a difference in the amount of maternal nonverbal communication used depending on child gender? b) Does maternal nonverbal communication use change over time? c) Do children who receive more nonverbal communication at 7 months have higher vocabulary scores at 24 months? The findings for each question will be discussed in detail below. Before discussing the findings, it should be noted that negative facial expressions, open body language, and closed body language will not be discussed in detail because parents showed little variability in their use of these measures. This is potentially due to the nature of the study where mothers were invited to the lab to play with their child in a recorded setting.

Nonverbal communication and gender

There were three predictions made based upon the specific questions asked above. First, we predicted that mothers would use more and more positive nonverbal communication (i.e. more positive facial expressions and open body language in addition to more eye contact/joint attention and deictic gestures) with girls than with boys, particularly at 24 months. This would show up in our analyses as a significant interaction between gender and age in our ANOVA. This did not turn out to be the case, as gender differences were not present with all nonverbal parameters at the 24-month stage. However, we did find some areas where gender differences did appear to be present. In particular, at the 7-month stage, we saw that mothers used

significantly more positive facial expressions with girls ($t(101) = 2.71$, $p=.008$) and at the 24-month stage, mothers used significantly more gestures with boys ($t(71) = 2.42$, $p=.018$). The 7-month result regarding facial expressions is consistent with previous literature that reported that mothers used more types and more intense facial expressions with infant girls from birth to one year old (Fivush et al., 2000). When studying parent-child play sessions when children were between 18 to 23 months, researchers found that a) children primarily played with same-sex toys (i.e. males played with masculine toys – trucks, cars, and blocks, and females played with feminine toys – dolls and a kitchen set) and that b) playing with feminine toys caused parents to remain in close proximity to their child and use more verbal communication (Caldera, Huston, O'Brien, 1989). On the other hand, playing with masculine toys led parents to make more sounds (e.g., the beeping noise associated with a truck) versus statements to encourage verbal communication from the child (Caldera et al., 1989). Although our finding of mothers using more positive facial expressions with girls occurred at 7 months, it is possible that the parent-child dyads in our study also chose to play with same-sex toys, which may have caused the parent to use more positive facial expressions based on the nature of the play items typically used with girls. The 24-month result regarding deictic gestures suggests that mothers may be more engaged with their sons at this age or possibly feel that boys need more direction compared to girls. Although we did not specifically code the child's toy choice in this study, boys might have played with more active toy options compared to girls and this may have provided mothers with more opportunities for gesturing. While observing parent-child dyads at 2 ½ to 3 ½ years old, Weitzman et al. (1985)

found that mothers used more verbal communication with sons compared to daughters, which supports our finding in the current study in terms of nonverbal behavior (gestures). The ANOVA results ($F(1, 66)=15.760$, $p<.0001$) showed that mothers also used more eye contact/joint attention with their children at 7 months than at 24 months even though there was not an interaction between gender and age with this parameter. This supports earlier research that discusses the importance of eye contact early in a child's life (Lohaus et al., 2001). In this study, mothers may have had more opportunity to look at their child's face at 7 months because children are less mobile at this age. In addition, there may have been more opportunity for joint attention at the younger age if the child was more active at 24 months.

Nonverbal communication use over time

The second prediction stated that mothers would be consistent in their nonverbal communication use over time. This meant that we expected mothers who used more nonverbal communication at 7 months to continue to do so at 24 months. A significant positive correlation was found between 7 months and 24 months, but only for gestures and positive facial expressions. Although there is minimal literature that clearly shows how nonverbal communication changes over time, Rowe et al. (2008) found that gestures used between parents and their children over a 20-month span remained constant. Özçalişkan and Goldin-Meadow (2005) likewise showed that caregivers continued to use gestures to communicate with their child over an eight-month span, which supports our findings regarding gestures. As noted above, mothers used less eye contact with older children; perhaps this general reduction in amount did not affect all mothers proportionately, leading to a lack of correlation between

relative amounts for mothers across time. Another explanation for lack of stability in mothers' use of eye contact may be the child's mobility. When playing with a non-mobile child, it can be easy to maintain eye contact. However, as children become more mobile, it can become harder to maintain eye contact. To the extent that children vary in their activity level, the amount of eye contact at 24 months may be driven in large part by the actions of the child, rather than the interactive style of the parent.

Nonverbal communication and vocabulary outcomes

The third prediction stated that children who received more nonverbal communication at 7 months would have higher 24-month MCDI vocabulary scores. Many studies have assessed how parental gesture use correlates with vocabulary growth (Rowe & Goldin-Meadow, 2009; Rowe et al., 2008) and the findings from these studies have shown an effect of gesture use on vocabulary development. In the current study, there was no apparent relationship between nonverbal communication (e.g. eye contact/joint attention, gestures, positive facial expressions, negative facial expressions, open body language, and closed body language) and vocabulary scores whether we looked at all children as a group or looked at the genders separately. The one exception, a significant statistical regression in the boys, was driven only by negative facial expressions, of which there were very few to begin with. As a result, this is likely a type 1 error. Rowe and Goldin-Meadow (2009) studied parents from high SES and low SES backgrounds and found a correlation between parental gestures (from the high SES group) and child vocabulary. Parents in Rowe and Goldin-Meadow (2009) may have had more of a variety in gesture use and children

may have had more of a variety in vocabulary outcomes since there was variability in SES. This is one explanation for the differences in the findings of Rowe and Goldin-Meadow (2009) and our current study since we did not have the same variability in participants. In a different study, which seems to have used participants from the same longitudinal study, Rowe et al. (2008), found that parental verbal communication directly related to child vocabulary and parental gestures indirectly related to child vocabulary outcomes. Instead, parental gestures related to gestures that were used by children, which is what predicted vocabulary development later in time. Rowe et al. (2008) analyzed parent-child dyads during play with toys, storybook reading, and meals. We only chose to look at toy play in our study, but it is possible that the structure of the parent-child interaction makes a difference in communication relating to later child vocabulary outcomes. In addition, other studies have shown that child gesture use directly influences vocabulary growth instead of parental gesture use (Özçalışkan & Goldin-Meadow, 2005). Even though we did not specifically look at child gesture use in this study, it may be the case that child gestures had an effect on vocabulary outcomes similar to the findings from previous studies. It is well known that parental verbal communication correlates with children's vocabulary growth (Pan, Rowe, Singer, & Snow, 2005), but it may also be the case that nonverbal communication simply does not have the same effect, at least in the current study. Overall, there does not appear to be significant gender differences with vocabulary outcomes as it relates to maternal nonverbal communication, which suggests that one gender is not at a disadvantage with vocabulary development in terms of maternal nonverbal communication use.

Clinical implications

Our results can also be discussed in terms of clinical implications. Gender differences were seen at 7 months with mothers' use of positive facial expressions with girls and at 24 months with mothers' use of gestures with boys. We can also consider how the results relate to the children's vocabulary. Given that maternal nonverbal communication did not seem to relate to children's later vocabulary outcomes, the differences by gender may not have real impacts on the child. We looked only at vocabulary outcomes, not at other areas of children's development (such as their ability to interpret emotion, etc.), thus, maternal nonverbal communication may simply play a role on other areas of development instead and this can be explored more in future studies.

If we had found strong relationships between any of the nonverbal communication parameters used by the mothers and the child's vocabulary outcomes, then we could say that, clinically, it would be important for mothers to use more nonverbal communication with their children in order to improve vocabulary outcomes. Based on the results of this study, we are unable to say that. For clinicians, it may be more useful to continue advising parents in terms of their verbal interactions with their children and not put as much emphasis on nonverbal communication.

More specifically, gender differences in positive facial expression use and gesture use may not actually affect vocabulary growth. However, a significant amount of prior literature has found an impact of gesture use on vocabulary. Our findings were simply unable to support this literature.

Limitations

There were also a variety of limitations with this current study. First, it is possible that the time frame that we analyzed (the first 15 seconds of each 6 minute period) was not long enough to collect a representative measure of mothers' nonverbal behavior patterns. It may be the case that 90 seconds was simply too short of a period to assess communication style. In addition, as mentioned previously, being in a lab setting may have led to inaccurate real measures.

Nonverbal parameters in our study that did not work well include open body language, closed body language, and negative facial expressions. As discussed earlier in the paper, there are other ways to assess body language and maybe the types of body language we chose to analyze simply were not realistic parameters to target for this study. All mothers were seated on the floor with their child, with access to a variety of toys, for the entirety of the play session. Coding a nonverbal parameter, such as body language may work better in different settings (i.e. sitting at a table or when the mother is standing up). Coding negative facial expressions may work better in other settings as well. Mothers used very few negative facial expressions during these play sessions. The limited variability made it difficult to incorporate this data when analyzing gender differences and vocabulary outcomes.

Finally, the children came to the lab for the original longitudinal study at 7 months, 10 months, 11 months, 18 months (for a subset), and 24 months. We chose to look at the 7 month and 24 month videos since this provided us with the greatest amount of time to analyze the consistency of mothers' nonverbal communication. Instead of analyzing the 7 month videos, perhaps we would have seen different results

if we analyzed a slightly older age (e.g., 10 or 11 months), as children were limited in what they could do at the younger age, which may have affected the mothers' nonverbal behaviors.

Future directions and conclusions

There are a variety of ways this research could be expanded upon. To continue studying child gender differences, researchers could also examine whether nonverbal communication with speech has different results than simply looking at nonverbal communication independently. As previously mentioned, future research should continue to look at maternal nonverbal communication and the effect on other areas of child development aside from vocabulary outcomes, such as social skills or interpreting emotion. In this study, negative facial expressions, open body language, and closed body language did not work as predictive parameters to analyze, but they may work better in different settings (e.g., a standard play session with specific goals, such as, completing a particular task or a play session requiring parent-child dyads to sit at a table, etc.). In addition, these nonverbal communication parameters could be assessed at older ages to see if gender differences exist, as the literature demonstrated some differences primarily at older ages. It may also be appropriate to assess nonverbal communication with other caregivers, such as fathers or a child's nanny, as these are also people that spend significant time with children. Finally, as previously stated, it would be interesting to assess the child's activity choices and child gesture use. Looking at the child's activity in combination with parental nonverbal communication could confirm or refute our earlier prediction that parents use more

gestures when their child chooses more active play options. Analyzing child gesture use would help highlight its importance in vocabulary growth.

To conclude, the relationship between a parent and child is important for a variety of reasons. One of the most important factors in these relationships is the type of communication used, which includes different forms of nonverbal communication. We were able to discuss the effect of eye contact/joint attention, deictic gestures, positive facial expressions, negative facial expressions, open body language, and closed body language. As previously discussed, the type of communication can significantly affect later development in children.

Research has demonstrated that gender differences do exist in these parent-child relationships, primarily when children are toddlers. However, our findings only demonstrated gender differences in positive facial expressions at 7 months and gestures at 24 months. Understanding the consistency of nonverbal communication over time helps to show how children may be affected at different points in time during development. We were able to show that parents continued to use similar patterns of nonverbal communication with positive facial expressions and gestures. In this study, positive facial expressions and gestures also appeared to be the most relevant nonverbal communication parameters, which suggests that these forms of nonverbal communication may play a significant role in child development. In terms of vocabulary growth, there was no interaction with nonverbal communication use (with the exception of negative facial expressions with boys). This suggests that maternal nonverbal communication use might not have a significant effect on child vocabulary growth.

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